

REMARKS/ARGUMENTS

Favorable reconsideration of this application as currently amended and in light of the following discussion is respectfully requested.

Claims 1-24 are pending in the present application with Claims 2, 4, 6, 8, 10, 12, 14, and 16-24 withdrawn from consideration. Claims 1, 9, 11, 13, and 15 are amended by the present response.

In the outstanding Office Action, Claims 1, 3, 5, 7, 9, 11, 13, and 15 were rejected under 35 U.S.C. § 102(e) as anticipated by Imai et al. (Japanese Patent Application Publication No. 2002-289810, herein "Imai"), which is respectfully traversed for the following reasons.

Independent Claim 1 has been amended to recite a capacitor and that an adhesive layer includes a flat metal carbide film. The claim amendments find support in Figure 11 and in its corresponding description in the specification. No new matter has been added.

Briefly recapitulating, amended Claim 1 is directed to a semiconductor device that includes a semiconductor substrate, a conductive plug electrically connected to the semiconductor substrate and including Si, a flat electrically conductive silicon carbide film provided on the conductive plug, a capacitor, and an adhesive layer. The capacitor includes a lower flat electrode, a dielectric film on the lower flat electrode, and an upper electrode on the dielectric film. The lower flat electrode includes a noble metal and is provided above the silicon carbide film. The adhesive layer is provided between the silicon carbide film and the lower flat electrode and the adhesive layer includes a flat metal carbide film configured to adhere the silicon carbide film and the lower flat electrode.

In a non-limiting example, Figure 11 shows the conductive plug 20, the silicon carbide film 21, the adhesive layer 22, the lower electrode 23 and 24, the dielectric film 25, and the upper electrode 27.

Turning to the applied art, Imai shows in Figure 1 a semiconductor device having a plug 116, a protective coat 117, a lower electrode 118, a dielectric film 119, and an upper electrode 120. For a better illustration of the differences between the claimed invention and the device of Imai, the enclosed Reference Figure is used.

As can be seen in the Reference Figure, the device of Claim 1 illustrated in the left side of the figure is different from the device of Imai illustrated in the right side of the figure because the device of Imai lacks an adhesive layer.

It is noted that the outstanding Office Action asserts with regard to Imai that layer 100 corresponds to the claimed semiconductor substrate, layer 116 corresponds to the conductive plug, layer 117 corresponds to claimed flat electrically conductive silicon carbide film, layer 120 corresponds to the claimed flat electrode, and layer 118 corresponds to claimed adhesive layer.

However, Imai does not teach or suggest the claimed adhesive layer because layer 120 of Imai corresponds to the claimed upper electrode and layer 118 of Imai corresponds to the claimed lower electrode (see the Reference Figure).

The outstanding Office Action states at page 3, lines 14-16, that Imai discloses in paragraph [0044], lines 1-5, that the lower electrode 118 has a flat metal carbide film. However, section [0044] of Imai does not disclose a metal carbide layer but only noble-metals such as platinum, ruthenium or iridium as materials of the lower electrode 118.

Section [0065] of Imai teaches that no failures occur in the oxygen-atmosphere for heat treatment of a capacitor during a production process because the lower electrode 118

does not react with the silicon carbide film. Also, section [0078] of Imai discloses that a reactivity between the silicon carbide and a metallic material is generally low, and mainly two kinds of reactions (stated in the next paragraph of Imai) may occur depending on the metallic material. Moreover, section [0080] of Imai teaches that platinum, ruthenium and iridium (mentioned in the specification) do not react with the silicon carbide.

Based on the generic chemical reactions noted in Imai, the outstanding Office Action asserts that inherently a metal (platinum, ruthenium and iridium) of the lower electrode 118 of Imai reacts with the silicon carbide film 117 to form an adhesive layer. However, the outstanding Office Action disregards the teachings of Imai that the metals of the lower electrode 118 do not react with the silicone carbide film 117.

Therefore, Applicants respectfully submit that the lower electrode 118 of Imai is made of a material which does not cause the reaction stated in section [0080] of Imai. Because of this property of the lower electrode of Imai, the device of Imai prevents failures which can occur in the oxygen-atmosphere during the heat treatment, which is the goal of Imai.


In light of the above comments, Applicants respectfully submit that no reactions are caused between the lower electrode 118 and the silicon carbide film (protective coat) 117 in Imai, and thus, an adhesive layer is not formed in Imai between the lower electrode 18 and the silicon carbide film 117 as required by Claim 1.

Accordingly, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over Imai.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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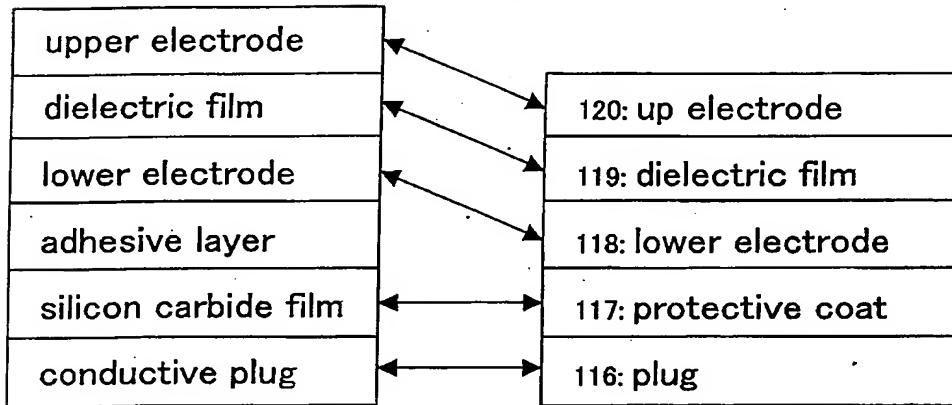
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ATTACHMENT

Serial No. 10/678,061



claim 1

Imai et al. (Fig. 1)

Reference Figure